

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application Serial No. : 10/056.233

Filed: 12/03/2001

Inventor: GUMMIN

Docket No.: 6100

5 Group Art Unit: 2834

Examiner: Jones

For: **SHAPE MEMORY ALLOY ACTUATOR**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

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**DECLARATION UNDER 37 CFR 1.131**

We, Mark Gummin and William Donakowski, declare that:

We are the co-inventors of the US patent application captioned above;

15 In the years 1996 and 1997 we were both employed at the Space Sciences  
Laboratory of the University of California in Berkeley, California;

During the course of our employment we conceived and reduced to practice  
the invention which became the subject of the US patent application captioned  
above, conception occurring in the United States in or about April, 1996 and

20 reduction to practice occurring in the United States in or about July, 1997;

We disclosed the invention to the University of California Office of

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Gummin Patent Application  
**SHAPE MEMORY ALLOY ACTUATOR**  
Joint Declaration under 37 CFR 1.131

Technology Licensing, as required by our employment agreements, in or about July, 1997, in a disclosure report titled "Displacement Multiplied Linear SMA Actuator," excerpts of which are attached hereto as Exhibit A, the Displacement Multiplied Linear SMA Actuator described in that report being the same invention

5 as that described and claimed in the application captioned above;

On a certain date in 1998, in the United States, Mark Gummin demonstrated to a colleague, Gerald Murphy, a working version of the Displacement Multiplied Shape Memory Alloy (SMA) actuator using SMA wire, as described and verified by the Declaration attached hereto as Exhibit B;

10 Thereafter the Office of Technology Licensing (OTL) took a decision not to pursue patenting or further development of the invention and we submitted a request to OTL to regain the rights in our invention;

15 On or about April 20, 1999 the OTL granted a release of all rights, title, and interest in and to the invention, as set forth in a letter from OTL to us, attached hereto as Exhibit C;

Thereafter we sought and engaged patent counsel, and began the process of drafting a patent application for the "Displacement Multiplied Linear SMA Actuator", which was filed May 8, 2000 and which is the parent application of the present continuation patent application; and,

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Gummin Patent Application  
**SHAPE MEMORY ALLOY ACTUATOR**  
Joint Declaration under 37 CFR 1.131

We did not at any time abandon nor suppress the invention.

We hereby declare that all statements made herein of our own knowledge  
are true and that all statements made on information and belief are believed to be  
5 true; and further that these statements were made with the knowledge that willful  
false statements and the like so made are punishable by fine or imprisonment, or  
both, under Section 1001 of Title 18 of the United States Code and that such  
willful false statements may jeopardize the validity of the application or any  
patent issued thereon.

10

Mark Gummin

Mark Gummin

10/24/03

Date

15

William Donakowski

William Donakowski

10-24-03

Date

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Gummin Patent Application  
**SHAPE MEMORY ALLOY ACTUATOR**  
Joint Declaration under 37 CFR 1.131

Licensing Associate

Date Assigned

UNIVERSITY OF CALIFORNIA, BERKELEY  
OFFICE OF TECHNOLOGY LICENSING  
INVENTION AND TECHNOLOGY DISCLOSURE

(please complete both sides - instructions attached  
(boxed area for OTL use only)

EXHIBIT A

USE ADDITIONAL SHEETS IF NECESSARY

1. Title of Invention

A DISPLACEMENT MULTIPLIED LINEAR SMA ACTUATOR

2. Brief Abstract of Invention (attach additional single-sided sheet)

(See attached)

3. Funding Source/Sponsor      Contract /Grant No.(s)

California Space Institute      CS-52-97

Principal Investigator

Dr. Mark Gummin

4. Events

Date

Comments/References

a. First conception of idea

8/96 (SSL, Berkeley) Design and constructed first prototype employing a displacement amplification design.

b. First description of complete invention, oral or written conception: identify document, page numbers and location of document

numbers and location of document April 1996 - Internal sketches and "white Board" (informal) Space Sciences Lab, Berkeley.

c. First successful demonstration of reduction to practice of invention

July 6, 1997 working prototype - Space Sciences Laboratory, Berkeley

d. First publication containing full description of invention (very important - establishes bar date)

None

e. External oral disclosures and to whom

Dr Michael Scholl, Lockheed Martin Engineer (former UC co-worker)

f. Planned submission of report, paper, thesis describing invention

(Planned) April 1998 Aerospace Mechanism Symposium

5. If proprietary material (e.g. cell line, antibody, plasmid, computer software, or chemical compound) obtained from outside your laboratory was used to develop this invention under a restrictive written or oral transfer agreement (other than normal purchasing agreement), please attach a copy or summary of that agreement.

None. Parker Berteau Aerospace (Irvine, CA), Allied Signal (Torrance, CA), Koll Morgen (Radford, VA), Trombetta (Milwaukee, WI), IMC Magnetics (Tempe, AZ), Aura Systems (El Segundo, CA), Airpax Mechatronics (Cheshire, CT) CER Industries (Haines, FL) Polytec PI Inc. (Costa Mesa, CA)

6. List companies you think might be interested in using, developing or marketing this invention. (List here - do not include as part of the invention description.)

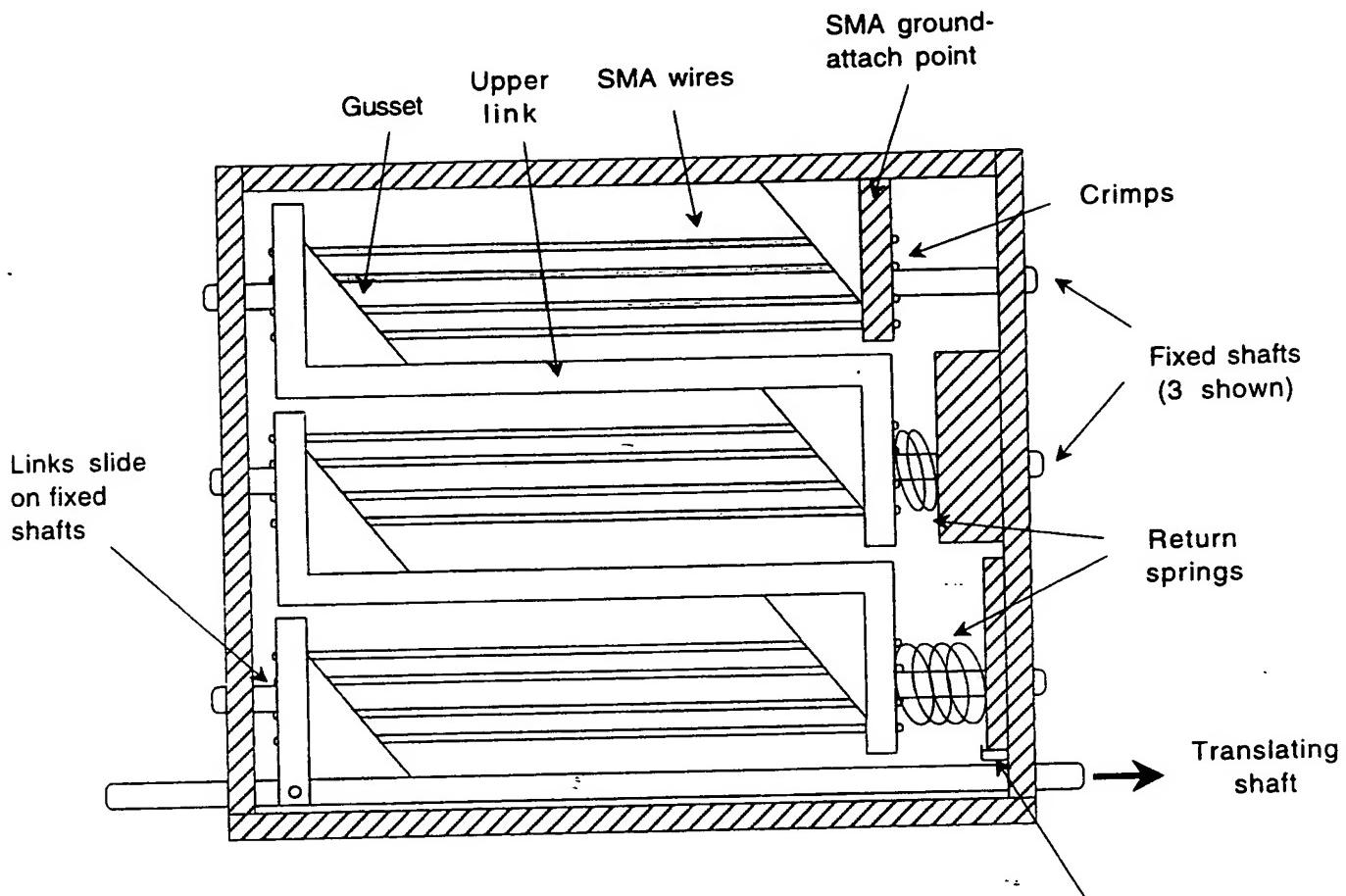
Starsys, Inc. (Boulder, CO) TINI Aerospace (San Leandro, CA) MPC Products (Stokie, IL) TRW Automotive (Cleveland, OH) United Technologies (Stamford, CT) Eaton Corp. (Cleveland, OH), Loral Space Systems (Palo Alto, CA) Lockheed Martin (Sunnyvale, CA)

# The Minimal Actuator

(Link design)

MAG 2/10/97

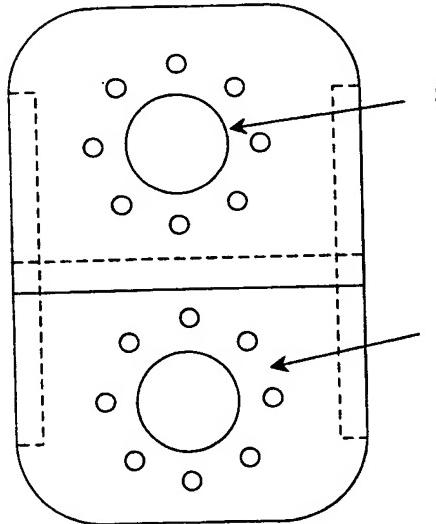
v 1-a



\*Segments in series  
(for displacement amplification)

Side-view of  
upper link

\*Wires in parallel  
(for redundancy &  
force amplification)



Shaft bearing

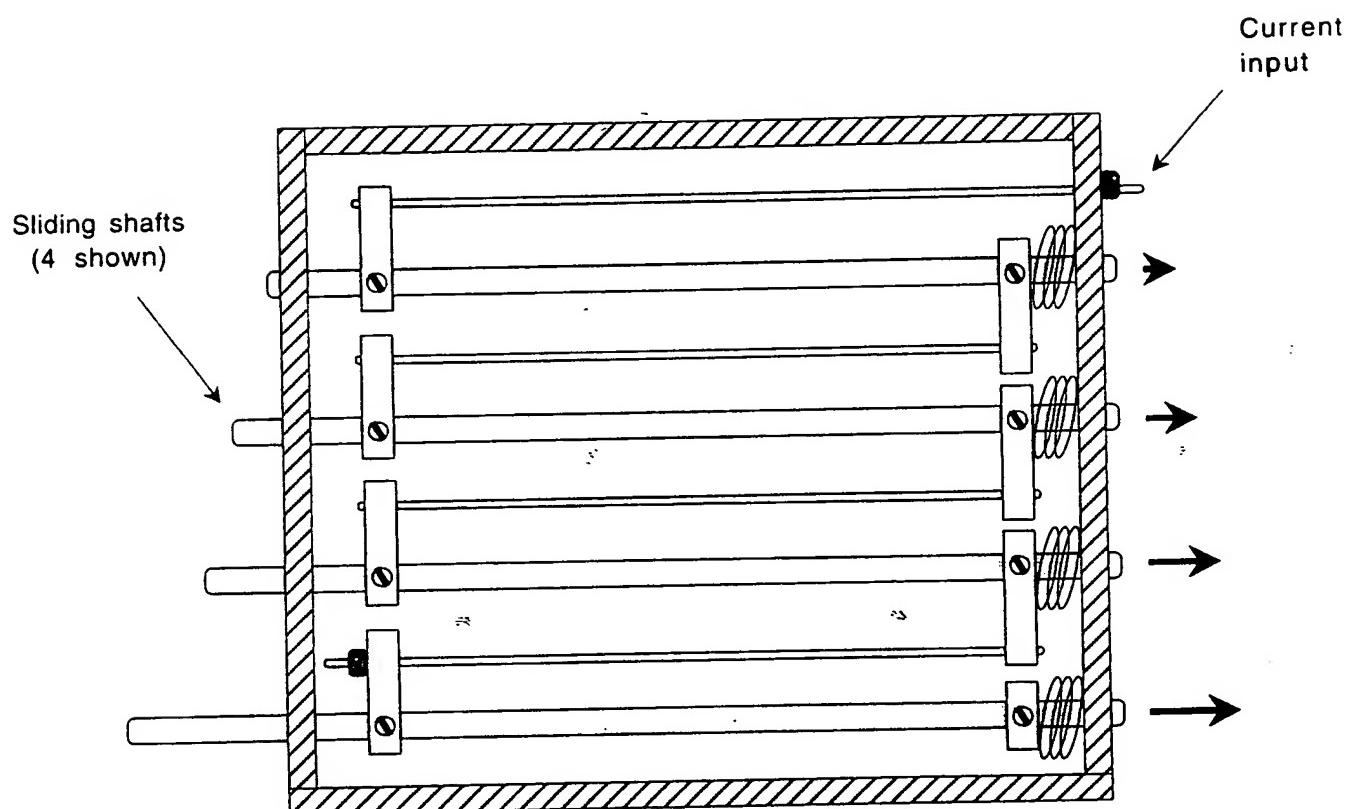
Annular wire  
arrangement  
diametrically  
distributes  
force

# *The Minimal Actuator*

(Link design)

MAG 2/10/97

v 1-b



# EXHIBIT B

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Serial No. : 10/056.233

Filed: 12/03/2001

Inventor: GUMMIN

Docket No.: 6100

Group Art Unit: 2834

Examiner: Jones

For: **SHAPE MEMORY ALLOY ACTUATOR**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

### DECLARATION UNDER 37 CFR 1.131

I Gerald Murphy, declare:

that I am General Manager of Design Net Engineering, an Aerospace consulting company specializing in electrical systems engineering;

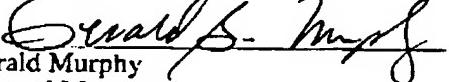
that on a certain date in 1998 Dr. Mark A. Gummin demonstrated to me a working version of a Displacement Multiplied Shape Memory Alloy (SMA) actuator using SMA wire. The actuator was demonstrated to me in Berkeley, CA, and I observed it in operation. The device consisted of parallel sliding bars or members interconnected by SMA wires, each member experiencing additive displacement relative to the adjacent members, and an electrical current was passed through the wires to heat and contract them to cause the displacement of the adjacent members. The device was relatively compact and lightweight, and provided a long stroke relative to the package length.

Accompanying Photos 1 and 2 on page 3 of this declaration show the device that was demonstrated to me on that day.

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Gummin Patent Application  
**SHAPE MEMORY ALLOY ACTUATOR**  
Murphy Declaration under 37 CFR 1.131

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

  
Gerald Murphy  
General Manager,  
Design Net Engineering

10/23/03  
Date

Photo 1

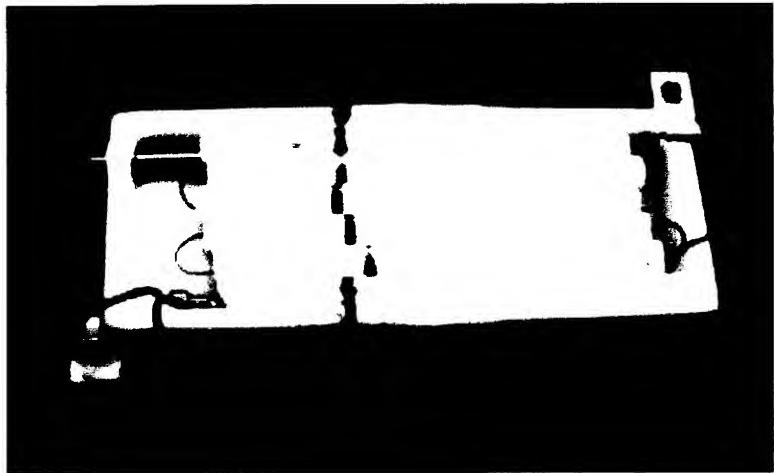
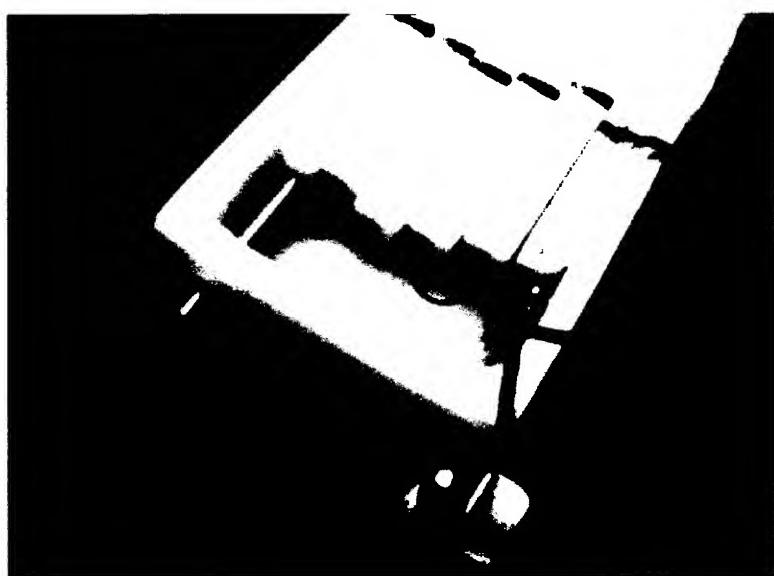


Photo 2



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Gummin Patent Application  
**SHAPE MEMORY ALLOY ACTUATOR**  
Murphy Declaration under 37 CFR 1.131

# EXHIBIT C

FROM : ALIAS Aerospace, Inc.

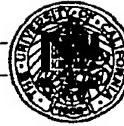
FAX NO. : 7079670343

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## UNIVERSITY OF CALIFORNIA, BERKELEY

BERKELEY • DAVIS • IRVING • LOS ANGELES • RIVERSIDE • SANDIEGO • SAN FRANCISCO

SANTA BARBARA • SANTA CRUZ



Office of Technology Licensing  
2150 Shattuck Avenue, Suite 510, #1620  
Berkeley, CA 94720-1620

Office: (510) 643-7201  
FAX: (510) 642-4566  
email: dgcrav@uclink4.berkeley.edu

April 20, 1999  
**IN DUPLICATE**

Dr. Mark Gummin  
MAG Systems  
1731 St. Andrews Court  
St. Helena, CA 94574

Dr. William Donakowski  
108 Space Sciences Lab  
Centennial @ Grizzly Peak Blvd.  
University of California  
Berkeley, CA 94720-7450

RE: Invention Disclosure  
A DISPLACEMENT MULTIPLIED LINEAR SMA ACTUATOR  
UC Case No.: B98-011

Dear Drs. Gummin and Donakowski:

In response to your request for permission to proceed on your own in the further development and commercialization of the Invention, the University agrees to release its rights to the Invention to you in accordance with the following agreement:

Pursuant to University of California Patent Policy you have fully disclosed and reported to the University of California Office of Technology Licensing ("OTL"), on its Invention and Technology form and subsequent communication, the Invention referenced above.

You also assert the following:

- 1) that the Invention was not made with the use of any federal support or funds;
- 2) that no further development of the Invention is presently in progress or is contemplated by you or by others at your request using University funds or facilities;
- 3) that, at the time of your acceptance of the terms of this letter, you have not entered an agreement with a third party for the development or commercialization of the Invention;
- 4) that you are prepared to initiate prosecution for a U.S. Patent on the referenced Invention; and
- 5) that you have requested a release to you of patent rights from The Regents of the University, hereafter "The Regents."

You agree that the release of The Regents' rights in the referenced Invention are conditioned upon the University of California Patent Policy Article IIB (attached) that states such a release is granted to you provided that no further research or development

Dr. Mark Gummin  
Dr. William Donakowski  
April 20, 1999  
Page 2

of the referenced Invention will be conducted involving University support or facilities, and provided that a shop right is granted to the University.

You hereby grant The Regents:

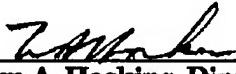
- i) a shop right and a royalty free license to make, have made and use the Invention for educational and research purposes, and
- ii) the right to permit other educational institutions to make, have made and use the Invention for educational and research purposes.

The Regents hereby releases to you all The Regents' right, title and interest in and to the Invention as disclosed and described in the subject cases, subject to The Regents' right to assert title by declaring the above release void from the beginning if, after one year from the date of this letter and yearly thereafter, you have not either expended funds in the further development of the Invention or commercialized the Invention by substantially satisfying the market demand for the Invention.

Please sign below to acknowledge your acceptance of the terms of this letter agreement. Keep one fully executed original for your records, and return the other fully executed original to Licensing Officer Doug Crawford for retention.

This offer for release of The Regents' rights shall expire ninety (90) days from the date of this letter unless a fully signed agreement is received prior to that date.

**THE REGENTS OF THE UNIVERSITY OF CALIFORNIA**

  
\_\_\_\_\_  
William A. Hoskins, Director  
Office of Technology Licensing

4/20/99  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Mark A. Gummin

4/26/99  
\_\_\_\_\_  
Date

\_\_\_\_\_  
William Donakowski

\_\_\_\_\_  
Date

WAH:rp  
Attachment